

John Philip Harris  
Paris

An Inaugural Disquisition  
against the  
Vitality of the blood

By James Kello of Virginia

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## Inaugural Dissertation

The subject of the vitality of the blood has the honor of great antiquity. We learn that the celebrated Jewish lawgiver, Moses, held in opinion that the blood was vital: and since his time it has been received and sanctioned by many great men as Aristotle, Plato, Galen, Harvey and John Hunter. But neither the antiquity of the opinion, nor these great authorities, ought to make us indolently receive it as truth, or ought to shade it in the least from our investigation.

As Mr Hunters opinions and experiments are the foundation of nearly all those on the subject at present; we shall proceed to examine some of them & see how far they are entitled to our belief or founded in truth.



He says "he cannot see how it is possible that we should think the blood is otherwise than alive, when we consider that every part is formed from the blood, and that we grow out of it." But to me it appears not more difficult to conceive, that living solids should be formed from dead blood, than that living blood should be formed from food destitute of all life.

Mr Hunter ~~made an~~ <sup>made an</sup> experiment ~~with~~ with a view to determine whether recent or coagulated blood would retain heat longest, and from his experiments he concluded that the recent would retain it longest, and hence he decided that the "heat retaining" power of the recent blood was a proof of its vitality.

But doubting whether it was a fact that recent blood would retain heat longer than coagulated, to satisfy myself, I made the following experiments, which being repeated



again and again, and the result being always the same, I must conclude that they are correct altho in opposition to Mr Hunters.

Into two ounces of blood as soon as <sup>it</sup> flowed from the vein of a healthy person, I introduced a Thermometer which rose to  $92^{\circ}$ . And in another vessel I had the <sup>same</sup> portion of coagulated blood heated to the same degree.

The Thermometer in recent blood stood at.....	The Thermometer in the coagulated blood heated to $92^{\circ}$
In 2 minutes it fell to 90	In 2 minutes it fell to 90
In 4 $D^{\circ}$ ..... $D^{\circ}$ ..... 88	In 4 $D^{\circ}$ ..... $D^{\circ}$ ..... 88
6 $\frac{1}{2}$ $D^{\circ}$ ... $D^{\circ}$ ... 86	6 $\frac{1}{2}$ $D^{\circ}$ ... $D^{\circ}$ ... 86
8 $D^{\circ}$ ... $D^{\circ}$ ... 85	8 $D^{\circ}$ ... $D^{\circ}$ ... 85
10 $D^{\circ}$ ... $D^{\circ}$ ... 84	10 $D^{\circ}$ ... $D^{\circ}$ ... 84
13 $D^{\circ}$ ... $D^{\circ}$ ... 82	13 $D^{\circ}$ ... $D^{\circ}$ ... 82
16 $D^{\circ}$ ... $D^{\circ}$ ... 80	16 $D^{\circ}$ ... $D^{\circ}$ ... 80
19 $D^{\circ}$ ... $D^{\circ}$ ... 79	19 $D^{\circ}$ ... $D^{\circ}$ ... 79

The temperature of the room was  $62^{\circ}$  when the experiment was made

again was again, and the small being always the  
 same I must conclude that they are correct and  
 in opposition to the others.

That the course of blood is very different  
 from the case of a healthy person, I infer from  
 a thermometer which was at 92°. And in one  
 the report of the pulse of circulation was  
 about 10 the same report.

The thermometer in water, the thermometer in the		other than at 92° regulated to this date 92°	
No. 1. 92° 00' 00"		No. 2. 92° 00' 00"	
No. 3. 92° 00' 00"		No. 4. 92° 00' 00"	
No. 5. 92° 00' 00"		No. 6. 92° 00' 00"	
No. 7. 92° 00' 00"		No. 8. 92° 00' 00"	
No. 9. 92° 00' 00"		No. 10. 92° 00' 00"	
No. 11. 92° 00' 00"		No. 12. 92° 00' 00"	
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No. 17. 92° 00' 00"		No. 18. 92° 00' 00"	
No. 19. 92° 00' 00"		No. 20. 92° 00' 00"	

The temperature of the room was 92° when the  
 experiment was made.



I repeated this experiment, with a little variation only, in the manner of making it. The result was the same.

In a basin fill'd with ice, I placed a cup containing four ounces of blood, just drawn from the arm of a healthy person.

The Thermom. in fresh blood stood at.....	The Thermometer in coagulated blood heated stood at
84°	84°
In 3 minutes it fell to 78	In 3 minutes it fell to 78
In 6 D°... D°... 72	In 6 D°... D°... 71
9 1/2 D°... D°... 68	9 1/2 D°... D°... 66
12 D°... D°... 65	12 D°... D°... 63
14 1/2 D°... D°... 60	14 1/2 D°... D°... 60
18 D°... D°... 58	18 D°... D°... 57
22 D°... D°... 53	22 D°... D°... 54
25 D°... D°... 51	25 D°... D°... 52

These experiments, I trust, were made with accuracy, and from their result, we must conclude, that this "heat retaining" power is not possessed by the blood, when taken out of the body, but



that it loses its heat in the same proportion  
as the coagulated blood: But even in the lung  
it does not possess this power, for we find that  
on the short time it takes to circulate, it loses  
several degrees of its heat. In the lung, when  
it receives its heat it is about  $96^{\circ}$  or  $98^{\circ}$ :  
but in the superficial veins it is not more  
than  $92^{\circ}$  here in the course of 4 or 5 minutes  
the time it takes to perform its circulation  
its parts with 4 or 5 degrees of heat.

Mr Hunter himself acknowledges that his  
experiment, on this subject, was not accurately  
made, for, says he, "the two bloods should have  
been at the same temperature." Whereas he  
had the coagulated blood heated to  $98^{\circ}$   
while the recent blood was only  $96^{\circ}$ . The coa-  
gulated blood being the hottest would of course  
part with its heat faster to any "neigh-  
bouring colder body, for we know the common

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any body is, the faster it will part with its heat to any colder body.

We shall now proceed to consider Mr. Huntley's ~~next~~ argument, which is founded upon a supposed similarity, in the coagulation of blood and ~~and~~ the contraction of muscle. But for my part I conceive the two contractions are widely dissimilar. When a muscle is stimulated to contract, it again returns to its state of relaxation if the stimulus be removed; But it is not so with the blood; for when once contracted, like other elastic, inanimate bodies, it remains so. With equal propriety we might say, there is a similarity between the coagulation of Milk and the contraction of muscles, for milk will coagulate and contract so much as to leave the sides of the vessel and form a cup like appearance and squeeze out the serum just in the same manner.

*[The text on this page is extremely faint and illegible. It appears to be a list or a series of entries, possibly with some headings or sub-headings. The right margin contains some faint, possibly handwritten, notes.]*

that blood does and the coagulation is also hastened by many stimulants, as electricity &c. as is that of the blood, yet no body would argue from hence that milk is alive. "And as the contraction in coagulation is the only particular effect instanced as produced by the stimulating influence on the blood, and as this effect would not be admitted as proof of vitality in any other fluid whatever, it can not as far as I am able to discover be made use of in illustration of the point in question."

We come now to consider the argument in which Mr Hunter seems to place most confidence for the support of his doctrine, that is, that extravasated blood is the bond of union between divided parts and that it has the power within itself of forming vessels, &c.

The only proof which Mr Hunter





fact, that the coagulum forms vessels, was  
an experiment made by himself. He says "By  
injecting the trunk artery of a stump, above  
the knee, where there was a small pyramidal  
coagulum, I have filled this coagulum with  
my injection, as if it had been cellular; But  
there was no regular structure of vessels." But  
Mr Hunter himself does not seem to place much  
confidence in this experiment, and we do not  
care if it proves any thing, it proves ~~not~~  
that in this instance, at least, the coagulum,  
did not form vessels; as M H says, he could  
not discover any regular structure of vessels.

Thus as there is no experimental proof that the  
coagulum forms vessels, nerves &c; this opinion  
must be founded on mere hypothesis.

Although Mr Hunter in his work on  
the blood gives that opinion & seems generally  
to think that coagulated blood, has the  
power

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power of forming vessels, and uniting divided parts, yet in one place he says, that this may be brought about by the inoculation of the divided vessels. In a note to page 1 of his work on the blood he says, "In many inflammations of the eye we find an artery or arteries passing from the tunica conjunctiva to the cornea, and ramifying on that part. These have been cut across to prevent the influx of the blood; the two ends as soon as they shrink, but in a little time they are again perceived to unite, and the circulation to be carried on as before." Now if we see this the case in one instance, why not suppose it is the case in every instance, that is not visible to the eye, or why search <sup>out</sup> a new method which is entirely hypothetical.

Coagulated blood, it is probable, by its glutinous texture, may be calculated



to favor and promote <sup>the</sup> reunion of divided parts  
but that it has the power within itself of  
forming vessels, nerves &c. is, we think, very im-  
probable. In the healing of wounds in which  
we can see the process go on, the vessels throw  
out granulations, and these unite to the sur-  
rounding parts, and the coagulated blood, if  
there be any, is reabsorbed; and why not sup-  
pose the same process to go on in the restoration  
of parts which are not visible to the eye;  
why invent a new mode of bringing about  
reunion, and this founded on mere hypothe-  
sis, when we see that parts can be readily  
reunited in another way.

We have thus briefly considered the  
arguments in favor of the vitality of the  
blood, and in as concise a manner as possible  
have endeavoured to shew that none of  
them are sufficient to support such an

opinion

A power and bound, remains of which have  
but that it has the power without itself of  
forming itself, never is, as that, say in  
practice. In the feeling of nature in us  
we can see the power of the mind in  
our perceptions and then with it in  
our feeling, and the regulated feeling  
then to any is regulated; and say, it is  
just the same power to go on in the sensation  
of power which are not with it, but  
and must be a more of feeling about  
ourselves, and the feeling in more sufficient  
as when we see that power can be made  
bounded in another way.

We have then this feeling consistent in  
ourselves in force of the reality of the  
thing, and in as much a means as possible  
some statement to show that we are  
then sufficient to support such an

opinion; How far we have succeeded we must leave to the candid and unprejudiced reader to decide. We do not deem <sup>it</sup> necessary to offer any apology, for opposing an opinion, which is taught us by some of the professors. The liberal indulgence of <sup>free</sup> investigation, in this university, is so remarkable as to render this unnecessary. Thus we shall take leave of this subject, but before I finish this essay, my duty impels me, to return my thanks, to each of the professors, for their zeal in giving instruction and in promoting the science of medicine. I have only to regret that it is not, more publickly, in my power, to acknowledge, the inestimable advantage of attending the lectures of the "illustrious professors," of this University.

Finis

J. Kelto, born in Southampton County, Virginia, in the year 1785.

opinion; that for the best advantage we must  
leave to the count and university what  
it thinks. It is not duty, indeed, to offer  
any apology for opposing an opinion which  
is taught us by men of the highest  
liberal intelligence of investigation; in this  
university it is considered as a matter of  
honour. But we shall take leave of the  
subject, for when I finish this essay and  
shall reflect on it, I shall not think  
a word of the professor for ever great in  
giving instruction and in forming the  
science of mankind. I have only to repeat  
that it is not, nor possibly, in my  
power, to acknowledge the excellence of  
of obtaining the science of the human  
professor of the university.

Yours

I am, Sir, with great respect, your obedient servant